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MILLER IP GROUP, PLC
NORTHROP GRUMMAN CORPORATION
42690 WOODWARD AVENUE
SUITE: 200
BLOOMFIELD HILLS, MI 48304

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GAKH, YELENA G	

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MAU-SONG CHOU

Appeal 2008-3877
Application 10/628,991
Technology Center 1700

Decided: December 23, 2008

Before TERRY J. OWENS, THOMAS A. WALTZ, and
JEFFERY T. SMITH, *Administrative Patent Judges*.

WALTZ, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant seeks review under 35 U.S.C. § 134 from the Examiner's rejections of pending claims 1-3, 5-12, 14, and 21-26 in the Office Action, dated November 3, 2006. This Board has jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

The invention of the present application is directed to a system for detecting and analyzing hazardous materials in an aerosol cloud. Claim 1 is illustrative and reproduced below:

> 1. A system for detecting and analyzing chemical and/or biological aerosols in a sample cloud in the air, said system comprising:
>
> a radiation source, said radiation source directing a radiation beam towards the cloud, said radiation beam heating the cloud to raise the temperature of the cloud relative to its background; and
>
> a spectrum analysis device responsive to emissions from the cloud, said spectrum analysis device generating an emission spectrum of the chemical and/or biological aerosols in the cloud from the emissions.

The Examiner relies on the following prior art as evidence of unpatentability of the rejected claims:

Bernstein	4,496,839	Jan. 29, 1985
Carlon	4,568,190	Feb. 4, 1986
Ho	4,710,887	Dec. 1, 1987
Taylor	5,373,160	Dec. 13, 1994
Johnson	2004/0211900	Oct. 28, 2004

Childers, "Multi-pollutant concentration measurements around a concentrated swine production facility using open-path FTIR spectrometry", 35 *Atmospheric Environment* 1923-36 (2001)

Samuels, "Infrared spectral study of aerosolized ovabumin and aerosolized *Bacillus subtillis* and *Bacillus thuringiensis* spores", Proceedings of Fifth Joint Conference on Standoff Detection for Chemical and Biological Defense (2001).

The Examiner maintains the following rejections:[1]

1. Claims 1-3, 5-12, and 21-23 stand rejected under 35 U.S.C. § 102(b) as anticipated by Bernstein.

2. Claims 1-3, 5-7, and 21-23 stand rejected under 35 U.S.C. § 102(b) as anticipated by Taylor.

3. Claims 1-3, 5-7, and 21-23 stand rejected under 35 U.S.C. § 102(b) as anticipated by Childers, as evidenced by Taylor.

4. Claims 1-3, 5, and 21-23 stand rejected under 35 U.S.C. § 102(e) as anticipated by Johnson, as evidenced by Taylor.

5. Claims 8, 9, 11, 12, 14, and 24-26 stand rejected under 35 U.S.C. § 103(a) as obvious over Bernstein in view of Samuels.

6. Claim 10 stands rejected under 35 U.S.C. § 103(a) as obvious over Samuels and Bernstein in view of Ho or Carlon.

BACKGROUND OF THE INVENTION

The invention relates to a system for detecting and analyzing chemical and biological aerosols in a cloud, where the system comprises a radiation source and an infrared spectrometer (Spec. [0001]). The radiation source, preferably an infrared laser, radiates a sample cloud and heats the materials in the cloud, raising their temperature against the background (Spec. [0010]). The heated materials emit electromagnetic radiation, which is detected by a

[1] The following rejections from the Final Office Action were withdrawn in the Examiner's Answer (Ans. 2):

- Claims 1-3, 5-12, 14, and 21-26 under 35 U.S.C. §112, 2nd paragraph,
- Claims 1-3, 5-7, and 21-23 under 35 U.S.C. § 103(a) over Theriault, and
- Claims 8-9, 11-12, 14, and 24-26 under 35 U.S.C. § 103(a) over Samuels in view of Bernstein.

device, such as a Fourier Transform Infrared ("FTIR") spectrophotometer. In analyzing the emitted electromagnetic radiation, a wavelength is selected in resonance with the absorption lines of a suspected molecule. The emission intensity and spectrum of the emitted radiation indicates the presence of the suspected molecule (Spec. [0011]).

FINDINGS OF FACT

1. Bernstein discloses a system for remotely detecting and identifying unknown chemical species in an aerosol. The system uses a pulsed laser directed at an unknown chemical mass. The mass absorbs the energy of the laser. By a molecular energy transfer process, the absorbed energy is re-emitted at one or more non-resonant wavelengths. The re-emitted radiation can be detected for a time period comparable to the characteristic time for the energy to be dissipated as heat. The re-emitted energy at the non-resonant wavelengths is detected with several infrared detectors (Abstract, col. 2, ll. 23-41). The laser is a CO_2 laser (col. 2, ll. 67-68).

2. Bernstein discloses a pulsed laser with a control circuit 40a and a firing circuit 60, which pulses the laser (col. 4, ll. 21-24).

3. Taylor discloses a system including a pulsed CO_2 laser 22, directing an infrared laser beam along a beam path 80 (col. 6, ll. 15-24). The laser illuminates gases along the beam path (col. 4, ll. 49-52). The illuminated gases selectively absorb radiation at specific frequencies. A detector discriminates for known patterns of absorption (col. 1, ll. 44-49).

4. Childers discloses a system including a monostatic OP/FTIR monitor, which includes a non-specific infrared source and detectors in a combined transmitting/receiving telescope (p. 1926). A retroreflector reflects an IR beam emitted from the telescope transmitter back to the telescope receiver (p. 1927). The system measures concentrations of ammonia and methane gas at a swine production facility (p. 1924).

5. Johnson discloses a system including a broadband infrared radiation source and a remotely-positioned receiver. The source is in view of the receiver. The receiver collects spectral infrared absorption data representative of the gas between the source and the receiver (Abstract).

6. Ho discloses an aerosol generating system for generating a constant concentration of an aerosol in a chamber. (Abstract). The chamber 10 includes a small electric fan 20 to distribute the aerosol within the chamber (col. 2, ll. 6-8).

7. Carlon discloses a system for generating an aerosol cloud in a chamber. (Abstract). Disposed within the chamber 10 is a rotary fan 20. (col. 7, ll. 54-55). The fan's purpose is to continuously, thoroughly and uniformly stir and intermix the aerosol particles to maintain a homogeneous aerosol (col. 7, ll. 48-51).

8. Samuels discloses a system for detecting biological microbes in an aerosol using a blackbody radiation source and an FTIR spectrometer with a ZnSe window installed at either end of a chamber (pp. 2-3).

PRINCIPLES OF LAW

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior

art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 827 (1987)

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007).

The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966),

"The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR*, 127 S. Ct. at 1739.

"It is well settled that the recitation of a new intended use for an old product does not make a claim to that old product patentable." *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

"A patent applicant is free to recite features of an apparatus either structurally or functionally. [Citation omitted]. Yet, choosing to define an element functionally, i.e, by what it does, carries with it a risk. As stated in *In re Swinehart,* 439 F.2d 210, 213 (CCPA 1971):

> Functional terminology may render a claim quite broad. By its own literal terms a claim employing such language covers *any and all embodiments* which perform the recited function." [emphasis in

> original]. "[W]here the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on."

In re Schreiber, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

ANALYSIS

Grouping of Claims

In regards to the four §102 rejections, Appellant argues independent claims 1 and 21 together. (*See* App. Br. 9-14)[2]. Appellant subsequently argues for allowance of the remaining dependent claims as a group, asserting generally that the prior art references do not teach the limitations of the dependent claims. (App. Br. 15). Therefore, the claims 1-3, 5-12 and 21-23 will be addressed as a group in regards to the § 102 rejections, to stand or fall together, with claim 1 as representative. 37 C.F.R. § 41.37(c)(1)(vii).

Anticipation by Bernstein, Taylor, Childers or Johnson

Claim 1 stands rejected as anticipated by Bernstein (Rejection No. 1), Taylor (Rejection No. 2), Childers (Rejection No. 3), and Johnson (Rejection No. 4). In maintaining the rejections, the Examiner asserts that each reference anticipates the claimed invention. Each reference teaches a type of infrared radiation source (FF 1-5), such as a CO2 laser (FF 1, 3). Bernstein and Taylor teach a pulsed infrared laser. (FF 1, 2, 3). Childers

[2] We cite to and reference from Appellant's Second Supplemental Brief, dated August 3, 2007.

and Johnson teach generic IR sources, for example, a CO_2 laser, as evidenced in Taylor (Ans. 5).

The Examiner further asserts each reference teaches a spectrum analysis device, notably an FTIR spectrophotometer (*see* Ans. 3-5).

In his Brief, Appellant asserts that independent claims 1 and 21 are directed to a "radiation beam [that] heats the cloud itself relative to the clouds [sic, cloud's] background" (App. Br. 9 [emphasis in original]). Appellant also contends "that the frequency of the radiation beam is selected to be in resonance with target molecules, water vapor molecules or oxygen molecules in the cloud to cause the molecules to vibrate and increase the temperature of the cloud" (*Id.*).

Appellant distinguishes his claimed invention from the prior art by contending Bernstein teaches a laser radiation source which causes elevated vibrational temperature of the atoms of the target molecule above the bulk gas temperature of the cloud. Bernstein teaches the molecules decay and emit radiation from this excited vibrational state very quickly, on the order of 1 – 100 msec. Because of this short time period, Bernstein uses a short excitation pulse and rapid sampling rates (App. Br. 10).

In contrast, Appellant contends the claimed system looks instead to emissions from the aerosol cloud itself that occur from the cloud being at a higher temperature than the background. Because of this, Appellant contends his invention is "not restricted" to short excitation pulses and rapid sampling, but can employ long pulse or continuous wave (CW) type radiation (App. Br. 9-10).

Appellant notes that Taylor teaches a system including a laser emitting a pulsed laser beam through a gas and a detector that detects the

intensity of two separate frequency bands. Appellant contends that Taylor does not teach that the laser beam heats the gas relative to the surrounding background, nor a spectrum analysis device that generates an emissions spectrum of an aerosol in the gas (App. Br. 12-13).

Regarding Childers, Appellant notes it teaches an open-path Fourier transform infrared (OP/FTIR) spectrometer for measuring specified atmospheric gases, but does not teach using a radiation source to raise the temperature of a sample cloud relative to its background, or a spectrum analysis device that receives emissions from the cloud (App. Br. 13).

Finally, Appellant contends Johnson discloses an FTIR spectroscopy system with infrared radiation source, with a target gas emission disposed between the receiver and the source, but does not teach detecting emissions spectrum of an aerosol, and does not teach heating an aerosol cloud relative to its background to generate emissions (App. Br. 13).

While we are substantially in accord with Appellant's contentions of the teachings of the cited prior art references (*see* FF 1, 3, 4, and 5), we do not find Appellant's arguments persuasive. Appellant's arguments are directed to the operation of the system and not its structure. The claim limitations at issue, regarding directing a beam, heating the cloud, being responsive to emissions and generating a spectrum, are directed to the method of using the system. The first clause of claim 1 is directed to a radiation beam *directed towards a cloud* which then *heats the cloud* to a temperature above the background. These limitations are directed to the use or application of the radiation beam. Likewise, the second clause of claim 1 involves a spectrum analysis device which is *responsive to emissions from the cloud,* which *generates a spectrum of aerosols in the cloud.* Again, these

limitations are directed to the use or application of the spectrum analysis device. They do not limit *the structure* of the device. To the extent these limit the use or application of system, they do not render an otherwise known system patentable. *Schreiber*, 128 F.3d at 1477. Accordingly, we construe claim 1 on appeal as a system including at least two structures, namely a radiation source *capable* of heating a cloud to raise its temperature, and a spectrum analysis device *capable* of generating an emission spectrum of the aerosels in the cloud.

As correctly noted by Appellant, Bernstein involves a pulsed laser used to very briefly heat the outer layer of an aerosol droplet, without heating the surrounding bulk gas, or interstitial gas of the cloud (App. Br. 10-12). Appellant attempts to distinguish the laser of his invention by noting that his is "not restricted" to the short pulses (App. Br. 11). However, as construed above, claim 1 is not limited to non-pulsed or long-pulsed lasers. Further, nothing precludes the pulsed laser from performing the operation claimed by Appellant. The pulsed laser in Bernstein includes a control circuit to pulse the laser (FF 2). Thus, one of ordinary skill in the art would have a reasonable belief that the laser of Bernstein is capable of performing the claimed function, simply by the control circuit allowing the laser to radiate the cloud sufficiently long to heat both the aerosol droplets and interstitial gas of the cloud, with respect to the background. Appellant has not disputed that the sytem of Berstein is incapable of such use. *See Swinehart*, 439 F.2d at 213.

In Taylor, Childers, and Johnson, systems with infrared radiation sources and emissions detectors are taught which are used to analyze constituents in gases, not aerosols. Nevertheless, the systems are otherwise

identical to the claimed invention, differing only in the nature of the application to which they are put. Appellant does not argue that the sources and detectors disclosed in the three prior art references are not capable of this use.

To reject a claim under §102, all limitations of the claim must be found in the prior art. *Verdegall Bros. v. Union Oil Co. of California*, 814 F.2d at 631. For the foregoing reason, the rejections of claim 1 pursuant to 35 U.S.C. § 102 on grounds of anticipation by the four cited prior art references, and of claims 2, 3, 5-12 and 21-23 by representation, are sustained.

Obviousness over Bernstein in view of Samuels

Claims 8, 9, 11, 12, 14, and 24-26 stand rejected under 35 U.S.C. § 103(a) as obvious over Bernstein in view of Samuels. Similar to claim 1, these claims are directed to a system comprising a radiation source and a spectrum analysis device, but add a chamber for holding the aerosol, the chamber having a first end with a window and a second end (see App. Br. 19). Samuels discloses an aerosol chamber with an infrared detector mounted at a window at one end and a blackbody radiation source located at the other for heating an aerosol sample (FF 8).

Appellant contends Samuels does not teach a radiation source that heats an aerosol cloud relative to its background, but only a heated background (the blackbody radiation source) relative to the aerosol. When considered together with Bernstein, Appellant contends that neither prior art reference discloses a system in which a radiation source heats an aerosol cloud relative to its background (App. Br. 15).

We disagree. For the same reasons above, we determine Bernstein discloses a system having the limitations of a radiation source and a spectrum analysis device, capable of performing the function or application of heating an aerosol cloud against its background and detecting its emissions, and differing from the claimed invention only to its application or use. *Schreiber*, 128 F.3d at 1477. Samuels discloses a chamber for holding the aerosol for laboratory testing with a different source of infrared radiation. The Samuel system uses the blackbody source as a source of infrared radiation to excite aerosol droplets, in a similar manner as the infrared laser used in Bernstein. One of ordinary skill in this art would have expected to obtain the same emission spectra as shown in Samuels, regardless of the nature of the source generating the infrared radiation. Therefore, adapting the Samuels system with an IR laser, as described in Bernstein, would provide the same predicable results. *See KSR*, 127 S. Ct. at 1739. Therefore, the rejection of the claims as obvious over Bernstein in view of Samuels is sustained.

Obviousness over Bernstein in view of Samuels and further in view of Ho or Carlon

Claim 10 stands rejected under 35 U.S.C. § 103(a) as obvious over Bernstein in view of Samuels and further in view of Ho or Carlon. Claim 10 depends on claim 8, adding a further limitation of at least one fan for agitating a powder into the aerosol. Ho and Carlon each disclose a fan for mixing aerosol particles within a chamber (FF 6, 7).

Appellant contends that neither Ho nor Carlon teach or suggest using the disclosed fan to blow or distribute a powder into an aerosol in the chamber (App. Br. 17). Again, the limitation relied upon by Appellant for

distinguishing claim 10 from the applied prior art is a limitation on the application of the device. One skilled in the art would have found a fan that disperses or agitates an aerosol within a chamber would also have been capable of agitating a dispersed powder. Appellant has not satisfied his burden of showing the fans in either Ho or Carlon are not capable of functioning as claimed. Modifying the combination system of Bernstein and Samuels with a fan as taught in either Ho or Carlon would have yielded predictable results, and therefore, would have been obvious to one of ordinary skill at the time of the invention. *KSR*, 127 S. Ct. at 1739. Accordingly, the rejection of claim 10 is sustained.

For the foregoing reasons, the six rejections maintained by the Examiner are sustained. The decision of the Examiner is affirmed.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

Appeal 2008-3877
Application 10/628,991

PL initial:
sld

MILLER IP GROUP, PLC
NORTHROP GRUMMAN CORPORATION
42690 WOODWARD AVENUE
SUITE 200
BLOOMFIELD HILLS, MI 48304